AT THE HEART OF DATA STORAGE
The world of storage is changing rapidly; data is being created and shared at a phenomenal rate. From global institutions to small businesses and individual consumers, data storage needs are growing, as is the desire to readily access data regardless of device or location.

Advances in virtualization, cloud computing, IT as a service and big data are driving value and competitive advantages. Cloud-computing storage technology has significantly improved enterprise operations, with adoption rates soaring as the technology matures. As a result, the “cloud” is fast becoming the biggest buzzword of the digital age.

Until recently, employees needing access to computing services used to spend hours sitting behind an assigned desk on company premises, using a company PC. But now they can access those services while being out making customer visits, attending conferences, or simply working from home. Business has become truly mobile.

When workers are out of the office, they have more choices than ever for the applications and devices that they use for business. They can use smartphones, tablets and notebooks for work and access internet-based applications and information that live “in the cloud.”

Location is no longer a barrier to productivity as cloud computing allows you to access documents from almost anywhere, using almost any device, via a web browser. Documents can be accessed, edited, printed or simply stored for future use.

Cloud computing is changing the way we use computers at home and increasingly, for work, too — but the hype this technology trend has generated along the way can be overwhelming. That puts business leaders in a tricky spot. In economically challenging times, they can’t afford to ignore the promise of the business benefits that can be delivered by cloud computing.
THE CLOUD: SAFE STORAGE

For businesses, the impact of cloud computing is the transformation of corporate IT from the mysterious domain of in-house specialists to a utility service that is supplied by a third-party provider. In other words, it becomes a “utility”.

THERE ARE MANY BENEFITS TO THIS APPROACH, WHICH INCLUDE:

WHY DOES THE CLOUD MATTER?

- Elimination of the upfront costs of technology, as only the needed IT resources are paid for, often on a pay-as-you-go basis.
- Reduced reliance on in-house IT systems, which can be costly and time-consuming to maintain.
- Delegation of data security to a trusted provider possessing the expertise for applying the most stringent measures available.
- Greater flexibility and productivity, because vital applications can be accessed from anywhere via a web browser.
- Simplified access to the latest products and technologies available without the need to update the software on a fleet of computers.
- Greater level of document security than many companies are capable of achieving in-house.

DATA STORAGE – THE LIFEBLOOD OF THE CLOUD

Reliable data storage is the lifeblood of any enterprise. Toshiba, the most experienced and trusted storage manufacturer, is powering the cloud by offering the largest portfolio of industry-leading enterprise storage devices for cloud data centres. From high-capacity hard disk drives (HDDs) to high-performance solid state drives (SSDs), Toshiba enterprise drives can be found in the world’s most demanding data centres.

Today, the majority of digital data is still stored on HDDs, which are the foundation of nearly all data centres and are one of their most reliable hardware components. However, SSDs now also offer compelling advantages, such as lower energy consumption and faster data-access times.

THE CLOUD: BENEFITS
There is no such thing as one size fits all when it comes to data storage. Businesses will need to carefully assess their storage needs and choose the storage solutions that are best for them. Is high capacity, reliability or faster data access the top priority? With Toshiba’s tiered storage model, you can ensure that you will get the right mix of reliability, capacity, cost and enterprise features.

When choosing an enterprise SSD for example, you need to be aware of the different endurance class levels available. Not all low-cost, multi-level cell (MLC), flash-based SSDs are created equal. When you decide to house your data at a data centre outfitted with Toshiba SSDs, you can be assured that you are making the right choice – Toshiba invented NAND and has therefore industry-leading expertise and know-how.

### TIERED STORAGE – GET THE RIGHT MIX

<table>
<thead>
<tr>
<th>Tier</th>
<th>SSD Mission-Critical</th>
<th>Mission Critical</th>
<th>Business Critical</th>
<th>Cold/Archive Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>Low latency, highest performance, small amount of data, greatest reliability, I/O and performance consolidation</td>
<td>Mix of performance, capacity and availability</td>
<td>Lower performance, lower cost, larger capacity</td>
<td>Lowest cost for largest capacity</td>
</tr>
<tr>
<td>Usage</td>
<td>Mission Critical data, financial information, log and journal files, paging files, metadata or index files, VM- and I/O-based stores</td>
<td>Mission Critical active files, email, web databases, files, large files, All and I/O hosting, big data, high bandwidth</td>
<td>Home directories, data warehouses, data mining, backup, big data, high bandwidth</td>
<td>For data not required on a daily basis</td>
</tr>
<tr>
<td>Profile</td>
<td>Active data</td>
<td>Primarily active data</td>
<td>Mix of archive and idle data</td>
<td>Primarily idle or inactive data</td>
</tr>
<tr>
<td>Metrics</td>
<td>Focus on highest performance, IOPS and cost per IOPS, lower power consumption, small amount of data</td>
<td>Focus on high data throughput, IOPS, bandwidth and capacity, cost per IOPS, great reliability and superior performance</td>
<td>Focus on bandwidth and capacity, low cost per high-density capacity, optimized power efficiency</td>
<td>Focus on highest capacity and some bandwidth, efficient performance, cost effective, power management features</td>
</tr>
<tr>
<td>Categories</td>
<td>High Endurance SSD</td>
<td>Mid / Value Endurance SSD</td>
<td>Performance HDD</td>
<td>Read Intensive SSD Capacity HDD</td>
</tr>
<tr>
<td>Toshiba Core Products</td>
<td>PX03SHB</td>
<td>PX03S</td>
<td>PX04SMB</td>
<td>PX04SRB</td>
</tr>
</tbody>
</table>

### Toshiba Core Products

- PX03SHB
- AL12
- AL13
- HK3E2
- PX04SV
- PX04P
- PX04SMB
- PX04SRB
- MG04
- HK3R4
- HK3R
- HK3R2
- PX04SRB
- MG03
- MG04
- MG03
TOSHIBA ENTERPRISE HDDs

With more than 40 years of experience, Toshiba consistently designs, builds and supports industry-leading enterprise hard disk drives. The Toshiba Enterprise HDDs help both private and public data centers meet the demanding growth of unstructured data in high-density environments.

KEY ADVANTAGES:
- Up to 15K HDD Line-up and Small and Large Form Factor
- SAS and SATA interfaces with 24x7 reliability
- Highest-capacity enterprise drive for maximum density server
- Predictable reliability in multi-drive environments
- Maximizes data centre footprint with 2.5-inch HDDs.
- Improved power and cooling efficiencies with low power consumption
- Advanced Format and Legacy Format Support
- 3 / 5-years limited warranty and up to 2M hours MTTF

## ENTERPRISE HDDs
### 1: ENTERPRISE PERFORMANCE HDD
MIX OF CAPACITY, PERFORMANCE AND AVAILABILITY
- 2.5-Inch Form Factor
- Up to 15,000 RPM
- For Tier 1 enterprise servers

### 2: ENTERPRISE CAPACITY HDD
LARGE CAPACITY
- 3.5-Inch Form Factor
- Up to 7,200 RPM
- For Tier 2 and Tier 3 servers

### 3: ENTERPRISE CLOUD HDD
LARGE CAPACITY
- 3.5-Inch Form Factor
- Cost efficient
- For Tier 3 servers

## FAMILY MODEL NUMBERS

<table>
<thead>
<tr>
<th>Family</th>
<th>Model Number</th>
<th>Capacity (GB)</th>
<th>RPM</th>
<th>Interface</th>
<th>Latency (ms)</th>
<th>Buffer (MiB)</th>
<th>Average Data Transfer Rate (outer track) (MiB/s)</th>
<th>Power Consumption (W)</th>
<th>MTTF (hour)</th>
<th>Temp. Op. (degree C)</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL14</td>
<td>AL14SEBxxxN</td>
<td>300, 450, 600, 900, 1200</td>
<td>10,500</td>
<td>SAS 12.0 Gbit/s</td>
<td>2.86</td>
<td>128</td>
<td>205</td>
<td>8.7</td>
<td>2,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL13</td>
<td>AL13SXBxxxN</td>
<td>300, 450, 600, 900</td>
<td>15,000</td>
<td>SAS 6.0 Gbit/s</td>
<td>2.0</td>
<td>64</td>
<td>243</td>
<td>5.0</td>
<td>9.0</td>
<td>2,000,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AL13SEBxxx</td>
<td>300, 450, 600, 900, 10,500</td>
<td>10,500</td>
<td>SAS 6.0 Gbit/s</td>
<td>2.98</td>
<td>195</td>
<td>3.9</td>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG035CA</td>
<td>MG035CAx0A</td>
<td>1,000, 2,000, 3,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>155</td>
<td>0.0</td>
<td>11.3</td>
<td>1,200,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG033CA</td>
<td>MG033CAx0A</td>
<td>1,000, 2,000, 3,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>155</td>
<td>0.0</td>
<td>11.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MG04SCAx0AxxE/A</td>
<td>2,000, 4,000, 5,000, 6,000</td>
<td>7,200</td>
<td>SAS 12.0 Gbit/s</td>
<td>4.17</td>
<td>128</td>
<td>205</td>
<td>6.1</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MG04SCAx0AxxE/A</td>
<td>3,000, 5,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>185</td>
<td>0.2</td>
<td>11.3</td>
<td>1,400,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MG04SCAx0AxxE/A</td>
<td>3,000, 6,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>185</td>
<td>0.0</td>
<td>11.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MG04ACAx0AxxE/A</td>
<td>3,000, 6,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>128</td>
<td>205</td>
<td>5.0</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MG04ACAx0AxxE/A</td>
<td>3,000, 4,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>185</td>
<td>0.0</td>
<td>11.3</td>
<td>800,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MG04ACAx0AxxE/A</td>
<td>5,000, 6,000</td>
<td>7,200</td>
<td>SAS 6.0 Gbit/s</td>
<td>4.17</td>
<td>185</td>
<td>0.0</td>
<td>11.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NEW**

- SANITIZE INSTANT ERASE (SIE) Option
- NOISE REDUCTION
- LOW POWER CONSUMPTION
- 24X7 AVAILABILITY
- AES-256 SELF-ENCRYPTING DRIVE OPTION

**THE CLOUD: PRODUCTS**
TOSHIBA ENTERPRISE SSDs

For almost 30 years, we've changed the world by inventing the NAND Flash Memory. As a global industry-leader in high-end memory technology, Toshiba has the proven expertise and is equipped to offer data centres high-quality SSDs. Completely designed and produced in-house, the Toshiba SSDs deliver exceptional performance, endurance and durability to dramatically accelerate enterprise applications.

Toshiba Enterprise SSDs deliver faster speeds, greater reliability and a better TCO for your data centre.

KEY ADVANTAGES:

- In-house production of NAND Flash Memory and Controller, ensuring end-to-end integration, compatibility and quality assurance
- Best-in-class performance and endurance for demanding data
- SAS, SATA and PCIe Line-up
- 24x7 operation
- Ideal for high-performance computing, online transaction and heavy data analytics
- 2.5" (SFF) and Add in Card (AIC)
- Wide endurance portfolio to match all workload requirements
- Equipped with Power-loss protection and End-to-end data protection to prevent data loss
- 5 Years limited warranty

ENTERPRISE SSDs

1: HIGH ENDURANCE SSD
- Higher level of endurance
- Up to 30 DWPD*
- Superior performance & reliability
- For mainstream servers

2: MID ENDURANCE SSD
- Enhanced level of endurance
- 2.5-Inch Form Factor™
- Add in Card
- Up to 10 DWPD*
- For mixed workloads

3: VALUE ENDURANCE SSD
- Mix of endurance, cost & performance
- 2.5-Inch Form Factor™
- Up to 3 DWPD*
- For mainstream servers

4: READ INTENSIVE SSD
- Superior power consumption efficiency enables TCO reduction

<table>
<thead>
<tr>
<th>Model</th>
<th>Model Number</th>
<th>Capacity (GB)</th>
<th>Read DWPD</th>
<th>Write DWPD</th>
<th>Endurance (MiB)</th>
<th>Performance Random (IOPS)</th>
<th>Performance Sequential (MiB/s)</th>
<th>Power Consumption (W)</th>
<th>Temp. Op. (degree C)</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>P304S</td>
<td>PX04S</td>
<td>200, 400, 800</td>
<td>25</td>
<td>10</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04SHBxxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04SMBxxx</td>
<td>400, 800, 1,600</td>
<td>10</td>
<td>5</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04PMBxxx</td>
<td>(2.5&quot;)</td>
<td>3</td>
<td>1</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04PMCxxx</td>
<td>(AIC)</td>
<td>2</td>
<td></td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td>P304S</td>
<td>PX04SMBxxx</td>
<td>200, 400, 800</td>
<td>10</td>
<td>5</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04SMBxxx</td>
<td>400, 800, 1,600</td>
<td>3</td>
<td>1</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td>P304S</td>
<td>PX04SMxxx</td>
<td>200, 400, 800</td>
<td>3</td>
<td>1</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04SMxxx</td>
<td>400, 800, 1,600</td>
<td>3</td>
<td>1</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td>P304S</td>
<td>PX04SMxxx</td>
<td>200, 400, 800</td>
<td>10</td>
<td>5</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PX04SMxxx</td>
<td>400, 800, 1,600</td>
<td>3</td>
<td>1</td>
<td>1,900</td>
<td>270,000</td>
<td>50,000</td>
<td>3.2</td>
<td>–50</td>
<td></td>
</tr>
</tbody>
</table>

* DWPD: Drive Write Per Day
* SAS, SATA, PCIe: Different interfaces
* TCO: Total Cost of Ownership

NEW

NEW

NEW

NEW

NEW

NEW

NEW

NEW
WHAT THE EXPERTS SAY

**STORAGEREVIEW.COM**
"Looking at performance the PX04SMB drives didn’t just perform better than the other drives tested against it, it blew them out of the water. [...] In total the Toshiba PX04SMB is exceedingly impressive."

"The Toshiba PX03SN offers an impressive balance of price and performance, fleshing out Toshiba's PX series of enterprise SSDs as general purpose storage suitable for a variety of applications."

**TECHPOWERUP**
"What really sets this drive apart, though, is the amazing MySQL Enterprise performance, especially at low-thread counts, where the drive delivers more than three times the throughput of other SSDs."

**NIKKTECH**
"Thanks to its performance levels the AL13SXB600N gets our Golden Award."

**MyCE**
"The Toshiba THNSNJ960PCSZ has an outstandingly low level of power consumption." 
"I am pleased to award the Toshiba THNSNJ960PCSZ our top rating of ‘Outstanding’."

**TOM’S HARDWARE**
"Each drive is engineered for highest performance and reliability and can be recommended without restrictions."

**KIT GURU**
"Toshiba has produced a decent STB drive that offers good value for money."

**MADSHRIMPS**
"Regarding the drive performance, MG04ACA400A performs much better than the drives we have previously tested."

**TWEAKTOWN**
"The Toshiba MG04 provided superior performance and excellent power consumption metrics across the board."

**TOM’S IT PRO**
"... you can see the PX04SMB churning out a beastly 306,872 4K random read IOPS under full load. This is well over the conservative rated specification of 270,000 IOPS."

"Toshiba's PX04S provides PCIe-like performance over the durable and resilient 12Gb/s SAS connection, making the PX04S the clear performance leader in the SAS segment."

"I am pleased to award the Toshiba AL13SXB600N HDD our rating of ‘Excellent’."

**MYCE**
"I am pleased to award the Toshiba AL13SXB8600N an excellent HDD and is also the fastest HDD I have ever used."

**STORAGEREVIEW.COM**
"The net result is the Toshiba HK3R2 sets a new performance standard in the entry-enterprise SSD category, routinely dispatching its competition in our application tests and in most synthetic areas as well."

**TOM’S IT PRO**
"... you can see the PX04SMB churning out a beastly 306,872 4K random read IOPS under full load. This is well over the conservative rated specification of 270,000 IOPS."

"Toshiba has produced a decent 5TB drive that offers good value for money."

"Regarding the drive performance, MG04ACA400A performs much better than the drives we have previously tested."

**MADSHRIMPS**
"Toshiba has produced a decent 5TB drive that offers good value for money."

**TWEAKTOWN**
"The Toshiba MG04 provided superior performance and excellent power consumption metrics across the board."

**TOM’S IT PRO**
"... you can see the PX04SMB churning out a beastly 306,872 4K random read IOPS under full load. This is well over the conservative rated specification of 270,000 IOPS."

"Toshiba's PX04S provides PCIe-like performance over the durable and resilient 12Gb/s SAS connection, making the PX04S the clear performance leader in the SAS segment."

"I am pleased to award the Toshiba AL13SXB600N HDD our rating of ‘Excellent’."

**MYCE**
"I am pleased to award the Toshiba AL13SXB600N an excellent HDD and is also the fastest HDD I have ever used."

**STORAGEREVIEW.COM**
"The net result is the Toshiba HK3R2 sets a new performance standard in the entry-enterprise SSD category, routinely dispatching its competition in our application tests and in most synthetic areas as well."
For further information on Toshiba storage products and solutions and local sales information, please visit:
toshiba.semicon-storage.com